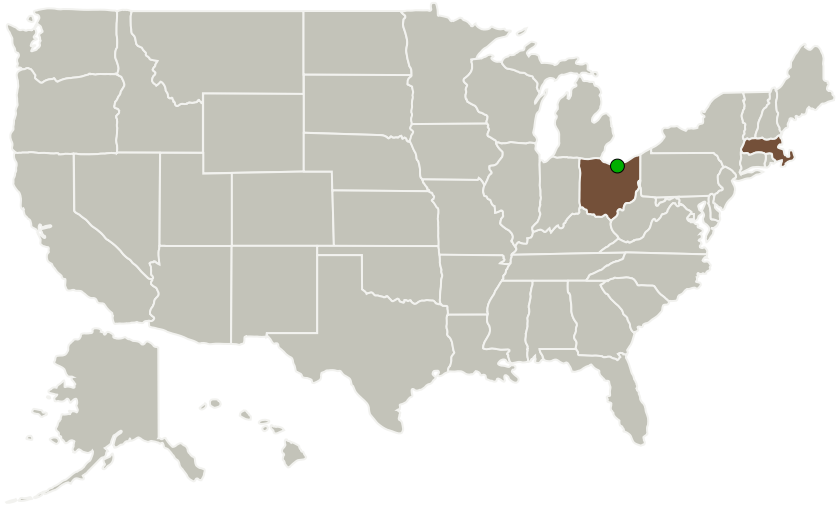
Mesoporous Silicon-Based Anodes for High Capacity, High Performance Li-ion Batteries, Phase II

Completed Technology Project (2011 - 2013)

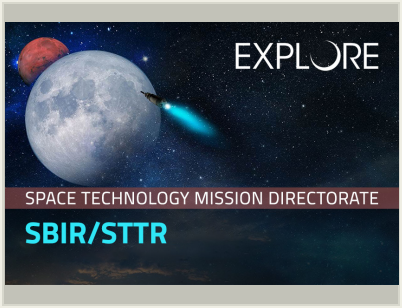
Project Introduction

A new high capacity anode composite based on mesoporous silicon is proposed. By virtue of a structure that resembles a pseudo one-dimensional phase, the active anode material will be able to accommodate significant volume changes expected upon alloying and de-alloying with lithium. The mesoporosity will be created without the aid of a surfactant template using a novel high volume synthetic process. The anode composite based on this material is designed to have a reversible Li-ion capacity exceeding 600 mAh/g or nearly twice that obtainable with graphite anodes; indeed much higher capacities could be practically attainable. Phase I successfully demonstrated the synthesis of this new meso-Si material as well as its high electrochemical activity and rechargeability. An expanded investigation on the development of mesoporous Si-based Li-ion anode is the principal objective in Phase II. The optimum anode will be evaluated in Li-ion cells containing 4V oxide cathodes.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
EIC Laboratories, Inc.	Lead Organization	Industry	Norwood, Massachusetts
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio



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Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

June 2011: Project Start

June 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139084)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

EIC Laboratories, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Dharmasena Peramunage

Co-Investigator:

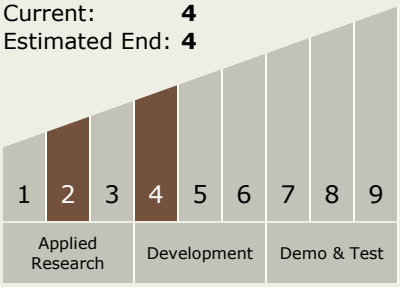
Dharmasena Peramunage

Mesoporous Silicon-Based Anodes for High Capacity, High Performance Li-ion Batteries, Phase II

Completed Technology Project (2011 - 2013)

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.1 Electrochemical: Batteries

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System